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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: James J. Finley and Mehran Arbab  
Appl. No.: 10/075,021  
Filed: February 12, 2002  
Title: DURABLE SPUTTERED METAL OXIDE COATING

Group Art Unit: 1775  
Examiner: Andrew T. Piziali  
Conf. No. 8098  
Docket No.: 1074D2

REPLY BRIEF

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Commissioner for Patents  
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Sir:

This Reply Brief responds to the EXAMINER'S ANSWER mailed September 26, 2003, in the above-identified application and addresses new issues raised by the Examiner's Answer.

Applicants acknowledge the withdrawal of the 35 U.S.C. 112 rejection of claim 51 (Issue (d)) and the 35 U.S.C. 102(b) rejection of claims 21 - 52 (Issue (e)). Only issues (a), (b), (c), and (f) remain and are discussed below.

The paragraph in Item (6) bridging pages 2 and 3 of the Examiner's Answer correctly states that applicants incorrectly assert that the issues with claims 38 – 42 (Issue (a)), claim 40 (Issue (b)), and claims 50 and

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Alexandria, VA 22313-1450 on <u>November 4, 2003</u>
(Date of Deposit and Signature) <u>Diane Krokonko</u>
<u>Diane Krokonko</u> (Signature)

52 (Issue (c)) is whether the claims are unpatentable under 35 U.S.C. 112, first paragraph, as being based on a nonenabling disclosure and that the actual issues is whether the claims are unpatentable under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement (new matter). The undersigned notes that the 35 U.S.C. 112 issue was incorrectly stated in the headings for Issues (a – c)) in the Appeal Brief and correctly stated in the paragraphs after the headings.

The undersigned has reviewed the file and believes that the error was made by typing the example given in the M.P.E.P. for correctly stating 35 U.S.C. 112 issues in Appeal Briefs. The undersigned respectfully submits that the error was unintentional and apologizes for any inconvenience the error may have caused.

#### ***APPLICANTS' RESPONSE TO THE EXAMINER'S ANSWER***

##### **Issues (a) – (c)**

Regarding Issues (a), (b), (c), the Examiner's Answer alleges that the amendments to claims 38 – 42 (Issue (a)), claim 40 (Issue (b)) and claims 50 and 52 (Issue (c)) would raise new issues that would require further consideration and/or search because the examiner has not considered and/or searched for the proposed product of amended claims 38, 40, 50 and 52.

Applicants respectfully submit that the amendments to claims 38, 40, 50 and 52 would not require further consideration and/or searching. The specification has already been considered and would require no further consideration and/or searching to determine if the admittance of the amendments to claims 38, 40, 50 and 52 would overcome the 35 U.S.C. 112 rejections.

##### **Issues (d) and (e)**

Issues (d) and (e) are withdrawn

**Issue (f)**

**Supplement to the Second Overview**

The First and Second Overviews are hereby incorporated by reference.

Applicants respectfully submit that an artisan would not combine Khanna and Depauw and vice versa, and if the combination was made, Applicants' claimed invention would not result. More particularly, column 1, lines 53 – 63, of Khanna states in part that:

The amorphous metal film is generally an alloy of one or more transition metals and metalloids. The transmission metals are selected from the group ..., titanium, zirconium.

The metalloids are selected from the group consisting of ....

(Underline added)

Applicants acknowledge that Khanna uses the term "metal" in the description of the invention; however, it is clear from a complete reading of Khanna, that Khanna deposits a metal alloy film and not a metal film. Further, independent claims 1 and 10 (the only independent claims) clearly recite that a "thin, uniformly thick, essentially pin-hole-free amorphous metallic alloy film" is deposited.

An artisan would not combine Khanna and Depauw because Khanna discloses depositing a metal alloy film and Depauw is interested in depositing metal oxide films and metal films, e.g. a silver film. For the sake of discussion only and not admitting that an artisan would combine Khanna and Depauw, and vice versa, the combination of Khanna and Depauw would be a coating stack having metal alloy films. Applicants' claims, on the other hand, are directed to a coating stack having amorphous metal films, metal oxide films and crystalline metal films, e.g. silver films.

Applicants further submit that the combination of Khanna and Depauw if made is made in hindsight. The coating of Khanna is used to protect the substrate against corrosion by providing a thin, uniformly thick, essentially pinhole-free film of a metal on the substrate surfaces. The glass substrate of Depauw has opposed major surfaces and sides, usually four

sides between and connecting the major surfaces. Depauw discloses coating a major surface of the glass substrate leaving one major surface and four sides exposed to the environment. There is no reasonable basis and minimal advantage, if any, to use the metal alloy films of Khanna to protect one major surface of a glass substrate.

Further, one skilled in the art would not use the metal alloy films of Khanna as an undercoat or overcoat film in the coating stack of Depauw because there is no disclosure that the metal alloy films of Khanna are compatible with the metal oxide films of Depauw, e.g. there is no disclosure in Khanna or Depauw that the metal alloy films of Khanna have optical, chemical and physical properties which contribute to the properties of the coating of Depauw as a whole (see column 5, line 48, to column 6, line 16). The films of Depauw are selected to reduce the percent reflection of the silver to make the coated substrate transparent for use as a window (column 4, lines 15 – 30, of Depauw). Khanna discloses that the pinhole-free film is dense and mirror-smooth (column 1, lines 28 – 32). A mirror-smooth surface is a surface that reflects substantially collimated beams of light and does not reflect non-collimated beams of light, e.g. scattered beams of light to have a clearly defined reflected image. One skilled in the art of making transparent solar control vision panels would not use the reflective mirror-smooth metal alloy films of Khanna for the transparent films of Depauw.

Based on the foregoing, one skilled in the art of coating would not combine the disclosures of Khanna and Depauw, and if the combination is made, it is made in hindsight and does not cover the subject matter of the applicants' claims.

#### **Claims 21 and 27 – 36 (stand or fall together)**

The above discussions are incorporated herein.

The Examiner's Answer alleges that it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the amorphous metal film of Khanna as at least part of the metal undercoat of Depauw, because the metal film disclosed by Khanna is a highly

corrosion resistant film that protect adjacent layers, and the metal undercoat of Depauw requires a corrosion resistant metal film that will protect the adjacent silver layer.

Applicants respectfully submit that Khanna discloses the depositing of a metal alloy film not a metal film. More particularly, column 1, lines 53 – 63, of Khanna states in part that :

The amorphous metal film is generally an alloy of one or more transition metals and metalloids. The transmission metals are selected from the group ..., titanium, zirconium.

The metalloids are selected from the group consisting of ....

(Underline added)

Applicants respectfully submit that the above disclosure of Khanna is a teaching that the film is an metal alloy and not a metal.

Applicants respectfully submit that one skilled in the art would not use the film of Khanna under the silver film of Depauw as alleged in the Examiner's Answer. The corrosion resistant, thin film of Khanna is deposited on a substrate to protect the substrate (column 1, lines 64 – 66). The substrate of Depauw is a glass substrate and is not subject to corrosion. Applicants acknowledge that Khanna discloses that the substrate can be glass (column 1, lines 35 and 35); however one skilled in the art of sputtering a solar control multi-layer coating on glass such as Depauw would not use the corrosion resistant film of Khanna on a glass substrate because there is no disclosure in Depauw that the coated glass substrate needs protection against corrosion and there is no disclosure in Depauw that the films of Depauw provide protection against the corrosion of the glass substrate. Clearly alleging the combination of references to solve a problem, e.g. corrosion of glass that is not present or discussed in any of the combined references is a hindsight combination of the references.

The Examiner's Answer further alleges that it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the amorphous metal film of Khanna as at least part of the metal undercoat of Depauw, because the metal oxide film disclosed by Khanna is a

highly corrosion resistant film that protects adjacent layer, and the metal undercoat of Depauw requires a corrosion resistant metal film that will protect the adjacent silver layer. Applicants respectfully disagree. Depauw discloses in column 4, lines 4 – 14, that the reasons for the improvement of the undercoat are not fully understood but it does seem that the presence of a single layer thin layer of zinc oxide immediately beneath the silver layer is important. One skilled in the art of sputter coating would not substitute one of the metal alloy films of Khanna for the zinc oxide film of Depauw because there is no disclosure that the metal alloy films of Khanna would provide the benefits obtained by using the zinc oxide film of Depauw.

The Examiner's Answer alleges that the film of Khanna would replace the inner metal film of the undercoat multi-layer (see column 8, lines 42 - 57 of Depauw). The inner metal film of the undercoat multi-layer is a titanium dioxide film. There is no disclosure in Khanna and/ or Depauw that would lead one skilled in the art to replace the titanium dioxide film of Depauw deposited on a glass substrate with an amorphous metal alloy film of Khanna to protect only one surface of a glass substrate.

Further, one skilled in the art would not use the metal alloy films of Khanna as an undercoat or overcoat film of Depauw because there is no disclosure that the metal alloy films of Khanna are compatible with the metal oxide films of Depauw, e.g. there is no disclosure in Khanna or Depauw that the metal alloy films of Khanna have optical, chemical and physical properties which contribute to the properties of the coating of Depauw as a whole (see column 5, line 48, to column 6, line 16).

Still further, the films of Depauw are selected to reduce the percent reflection of the silver to make the coated substrate transparent for use as a window (column 4, lines 15 – 30, of Depauw). Khanna discloses that the pinhole-free film is dense and mirror-smooth (column 1, lines 28 – 32). A mirror-smooth surface is a surface that reflects substantially collimated beams of light and does not reflect non-collimated beams of light, e.g. scattered beams of light to have a clearly defined reflected image. One skilled in the art

of making transparent solar control vision panels would not use the reflective mirror-smooth metal alloy films of Khanna for the transparent films of Depauw.

Based on the foregoing, applicants respectfully submit that one skilled in the art would not use the metal alloy reflective films of Khanna under the transparent silver layer of Depauw as alleged in the Examiner's Answer and that there is no disclosure in Depauw and/or Khanna or vice versa of the subject matter of claims 21 and 27 – 36.

**Claims 22 – 24 (stand or fall together)**

The above discussions are incorporated herein.

The Examiner's Answer alleges that Khanna deposits a titanium film. Applicants submit Khanna deposits a titanium alloy film. The Examiner's Answer and applicants both rely on column 1, lines 53 – 63, of Khanna. Khanna in column 1, lines 53 – 63, states in part that

The amorphous metal film is generally an alloy of one or more transition metals and metalloids. The transmission metals are selected from the group ..., titanium, zirconium.

The metalloids are selected from the group consisting of ....  
(Underline added)

Applicants respectfully submit that the above disclosure of Khanna is a teaching that the film is an alloy film and not a metal film.

The Examiner's Answer further relies on claim 2 of Khanna for support. Claim 2 is dependent on claim 1 and recites that the transition metal titanium is thoroughly mixed with metalloids to form a solid material that is bombarded to deposit a uniformly thick, essentially pin-hole-free amorphous metallic alloy film.

Based on the above, applicants respectfully submit that Khanna discloses depositing a metal alloy film containing titanium and not a titanium metal film as recited in the claims and that there is any disclosure in Depauw and/or Khanna or vice versa of the subject matter of claims 22 – 24.

**Claim 25 (stands alone)**

The above discussions are incorporated herein.

The Examiner's Answer alleges that Depauw discloses that the metal film preferably has a thickness ranging from 2 to 15 nm (20 to 150A) (column 8, lines 10 – 28). The Examiner's Answer is using the composition of the metal alloy films of Khanna and using the thicknesses of the films of Depauw to design a product that has the thicknesses recited in claim 25. The Examiner's Answer is picking and choosing portions of the disclosure of Khanna and Depauw for a hindsight combination and rejection. There is no teaching in Depauw and/or Khanna that the metal alloy films of Khanna are a direct substitute for the metal oxide films of Depauw. Further column 8, lines 10 – 28, of Depauw discusses the thickness of the sacrificial titanium metal film deposited over the silver. The Examiner's Answer alleges the film of Khanna is used under the silver film.

Based on the foregoing, it is clear that the Examiner's Answer is selectively picking portions of the disclosures of Khanna and Depauw for hindsight combination and rejection and that there is no disclosure in Depauw and/or Khanna or vice versa of the subject matter of claim 25.

**Claim 26 (stands alone)**

The above discussions are incorporated herein.

The Examiner's Answer alleges that Depauw discloses that each film in the overcoat may have a thickness ranging from 25 to 450 A (column 8, lines 47 – 57). The Examiner's Answer in the discussion rejecting claim 21 uses the film of Khanna below the silver layer and now relies on the thickness of the films over the silver layer to reject claim 26. This inconsistency clearly demonstrates that the combination of Depauw and Khanna or vice versa is made in hindsight.

Based on the foregoing, it is clear that the Examiner's Answer is selectively picking portions of the disclosures of Khanna and Depauw for hindsight combination and rejection, and that there is no disclosure in Depauw and/or Khanna or vice versa of the subject matter of claim 26.

**Claim 37 (stands alone)**

The above discussions are incorporated herein.

The Examiner's Answer alleges that although Depauw does not specifically mention a thermal treatment temperature range, Depauw disclosures that the coated product may be thermally oxidized (column 5, lines 21 – 35). Applicants respectfully submit that a correct reading of column 5, lines 21 – 35, relates to the titanium film over the silver film that protects the silver layer against oxidation that usually occurs during subsequent deposition of metal oxide, but also occurs during any subsequent heat treatment or during prolonged storage. Depauw does not disclose, as alleged by the Examiner's Answer that the coated product of Depauw may be thermally oxidized, Depauw disclosed that the titanium film protects the silver against oxidation that may occur during heat treatment.

Based on the foregoing, there is no disclosure in Depauw and/or Khanna or vice versa of the subject matter of claim 37.

**Claims 38, 41 and 42 (stand or fall together)**

The above discussions are incorporated herein.

The Examiner's Answer alleges that Depauw discloses that two metal oxide layers may be deposited on the metal film (column 8, lines 53 - 57). Claim 38 on which claims 41 and 42 are dependent is indirectly dependent on claim 21 and recites, among other things, that a metal oxide film is deposited on the metal film prior to thermal oxidation. The Examiner's Answer alleges that the metal alloy film of Khanna is used under the silver film as the innermost film (see discussion regarding claims 21 and 27 – 36). According to the teachings of Khanna and Depauw as combined by the Examiner's Answer, coating would be a metal oxide film of Depauw on a metal alloy film of Khanna. Applicants' claim 38 on the other hand recites a metal oxide film over a metal film.

Based on the foregoing, there is no disclosure in Khanna and/or Depauw, or vice versa of the product recited in claims 38, 41 and 42.

**Claims 39 and 46 (stand or fall together)**

The above discussions are incorporated herein.

Claim 39 is dependent on claim 38 and claim 46 is dependent on claim 21. The Examiner's Answer alleges that the titanium oxide film is over the metal film and has a thickness of 100A which is within the currently claimed thickness range. As discussed above there is no disclosure in Khanna and/or Depauw, or vice versa of the product recited in claim 38 on which claim 39 is dependent. Therefore Khanna and/or Depauw, or vice versa cannot teach the product covered by claim 39.

Claim 46 is dependent on claim 21. Applicants have shown above in the discussion regarding claim 21 that an artisan would not combine Depauw and Khanna and if the combination was made the product of claim 46 would not be disclosed.

Further, regarding claims 39 and 46, the Examiner's Answer is using the thickness of Depauw for the metal oxide films in combination with the metal alloy films of Khanna without any knowledge of the optical properties of the coated product having metal oxide films and metal alloy films. As discussed above, optical performance is a property of the coated product of Depauw.

Based on the foregoing, there is no disclosure in Khanna and/ or Depauw, or vice versa of the coated product of claims 39 and 46.

**Claim 40 (stands alone)**

The above discussions are incorporated herein.

The Examiner's Answer alleges that it appears that the metal oxide films taught by Depauw possess the currently claimed properties. The disclosure of Depauw in column 5, lines 1 – 7, states that the films may be sub oxide films. There is no disclosure of how the sub oxide films are deposited or their density and refractive index. The Examiner's Answer alleges that it appears the metal oxide films of Depauw have the same properties but have failed to show where there is support for the position. As

previously stated, Depauw regards the sub oxide films as a defect and does not disclosure how sub oxide films are obtained.

Based on the foregoing, there is no disclosure in Khanna and/ or Depauw, or vice versa of the coated product of claim 40.

#### **Claim 43 (stands alone)**

The above discussions are incorporated herein.

The Examiner's Answer alleges that the appellant has failed to demonstrate, or even attempted to demonstrate, that there is a difference in optical properties or density of the currently claimed amorphous metal film and the amorphous metal film taught by Khanna. Applicants disagree with the allegations of the Examiner's Answer. Applicants have shown that the film of Khanna is an metal alloy film whereas the film recited in claim 43 is a titanium metal film. As can be appreciated, a titanium alloy film has different density and refractive index than a titanium metal film. Further, the Examiner's Answer has failed to show that Khanna discloses an amorphous titanium metal film. Further applicants disclose on page 5, lines 1 – 5, that the lower density of the amorphous titanium metal film enhances it rate of oxidation. Khanna discloses that the amorphous metal alloy film is dense and mirror-smooth (column 1, line 32, of Khanna). Clearly the teachings in applicants' specification and in Khanna demonstrate that the densities are different.

Based on the foregoing, there is no disclosure in Khanna and/ or Depauw, or vice versa of the coated product of claim 43.

#### **Claim 44 (stands alone)**

The above discussions are incorporated herein.

The Examiner's Answer alleges that the metal layer taught by the prior art is titanium metal and the oxide layer taught by the prior art is titanium oxide (see column 8, lines 42 – 57, of Depauw). Applicants respectful submit that coated product of claim 44 is a metal oxide film over an underlying amorphous metal layer of the same material. There is no disclosure in Depauw of a metal oxide film over an amorphous metal film of

the same material. Using the films of Khanna would provide a metal oxide film over a metal alloy film.

Based on the foregoing, there is no disclosure in Khanna and/or Depauw, or vice versa of the coated article recited in claim 44.

**Claim 45 (stands alone)**

The above discussions are incorporated herein.

The Examiner's Answer states that it is the position of the examiner that the coated product of Khanna in view of Depauw wherein the metal oxide is deposited as an oxide in a non-reactive atmosphere is identical to or only slightly different than the claimed coated product prepared by depositing then metal oxide films in a reactive atmosphere. Applicants respectfully disagree. Depauw does not disclose how to deposit a metal in a reactive atmosphere and Khanna discusses depositing a metal alloy film. Since Khanna and Depauw disclose the deposition of different films and Depauw does not disclose how to deposit a metal film in a reactive atmosphere, the films of Khanna and Depauw are not identical or slightly different from the films of claim 45; the films of applicants are patentably different than the films Khanna and/or Depauw.

Based on the foregoing, there is no disclosure in Khanna and/or Depauw, or vice versa of the coated article recited in claim 45.

**Claims 47, 49 and 50 (stand or fall together)**

The above discussions are incorporated herein.

The Examiner's Answer alleges that considering that the metal films are produced by a substantially identical process and are made of the same material, it appears that the metal film taught by Khanna posses the currently claimed properties.

Applicants respectfully submit that Khanna does not disclose depositing the same metal films as claimed by applicants. Khanna discloses depositing a metal alloy film not a metal film, and there is no disclose in

Khanna that an amorphous metal film can be deposited according to the method of Khanna.

Based on the foregoing, there is no disclosure in the Khanna and/or Depauw, or vice versa of the coated article recited in claims 47, 49 and 50.

**Claim 48 (stands alone)**

The above discussions are incorporated herein.

The Examiner's Answer alleges that the metal film taught by Khanna is an amorphous metal oxide films sputtered from a metal cathode target (column 2, lines 33 – 37) in a atmosphere comprising an inert gas (argon) and Oxygen (column 3, lines 31 – 33) and Depauw teaches the subsequent oxidation of the metal film to a metal oxide film (column 5, Lines 21 – 27).

Khanna in column 1, lines 53 – 63, teaches that the amorphous metal is generally an alloy of one or more transition metals and metalloids. Applicants have not found any teaching in Khanna of depositing an amorphous metal film; the films deposited are amorphous metal alloy films. The Examiner's Answer in the above discussion referred to the claims Khanna. The claims of Khanna support applicants' position that Khanna teaches depositing a metal alloy film. More particularly, claims 1 and 10 the only independent claims recite at the end of the claims that a thin, uniformly thick, essentially pin-hole-free amorphous metallic alloy film is deposited. It is clear from the teachings of Khanna that the reference to the metal film is in fact a reference to a metal alloy film.

Based on the foregoing, there is no disclosure in Khanna and/or Depauw, or vice versa of the coated article recited in claim 48.

**Claim 51 (stands alone)**

The above discussions are incorporated herein.

The Examiner's Answer alleges that the metal film taught by Khanna is an amorphous metal film sputtered from a metal cathode target in

an atmospheres oxide films puttered from a metal cathode target (column 2, lines 33 - 37) in a atmosphere comprising an inert gas (argon) and oxygen (column 3, lines 31 – 33) and Depauw discloses that one or more oxide films may be subsequently deposited over the first metal film (column 8, lines 54 – 57) and that the oxidation of that metal film to a metal oxide film ( column 5, lines 21 – 27).

Applicants have clearly shown above that Khanna does not disclose the deposition of an amorphous metal film but the deposition of an amorphous metallic alloy film. Khanna defines "metal film" as "generally an alloy of one or more transition metals and metalloids" (column 1, lines 54 – 63, of Khanna). The combined teachings of Khanna and Depauw at best would give a metal oxide film over the film of an alloy of one or more transition metals and metalloids. The coated product made by the combination of Khanna and Depauw is not applicants' coated product of claim 51 which covers two metal oxide films.

Based on the foregoing, there is no disclosure in Khanna and/or Depauw, or vice versa of the coated article recited in claim 51.

#### **Claim 52 (stands alone)**

The above discussions are incorporated herein.

The Examiner's Answer alleges that the oxide film disclosed by the prior art, compared to the currently claimed oxide films is produced by a substantially identical process and is made of the same material and appears that the metal oxide film taught by the prior art possesses the currently claimed density.

Applicants respectfully submit that the prior art, in particular, Khanna discloses depositing a metal alloy film in an argon and oxygen atmosphere and not the titanium film recited in applicants claim 52. Therefore there is no support for the position of the Examiner's Answer that the film claimed by applicants is the same film claimed by the prior art.

Based on the foregoing, there is no disclosure in Khanna and/or Depauw, or vice versa of the coated article recited in claim 52.

## **Summary**

The Examiner's Answer has not considered fully the teachings of Khanna and Depauw. Khanna at best discloses a method of depositing an alloy of one or more transition metals and metalloids (column 1, lines 33 – 63). Khanna refers to the films as metal films but the composition of the metal films of the discussion in Khanna, in the examples of Khanna and in the claims of Khanna is that the film is an amorphous metallic oxide film. Depauw discloses in column 5, lines 1 – 7, that part of the product may be present as a sub-oxide or even as a metallic sate. This disclosure is a discussion of a defect that is cured by any following oxidations step. There is no disclosure in Depauw of how the sub-oxide or metallic state product may be obtained. Since there is no teaching that such a product can exist but a teaching that such a product may exist is not a teaching of applicants' invention. One skilled in the art would not combine Khanna and Depauw because Khanna relates to depositing metal alloy films and there is no disclosure in Depauw that any of the metal alloy film disclosed by Khanna can be used for the films of Depauw.

Applicants' acknowledge that Depauw in column 2, lines 22 – 68, mentions a target of an alloy of zinc and tin but does not use the target to deposit any films of the coated products disclosed by Depauw. Further, an alloy of zinc and tin is not disclosed in Khanna in column 1, lines 53 – 64, as an alloy that can be used in the practice of the invention of Khanna.

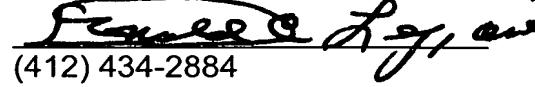
Based on the foregoing, it is respectfully submitted that the combination of Depauw and Khanna, and vice versa is made in hindsight. Further as shown above, if the combination of Khanna and Depauw is made, the coated product recited in applicants' appealed claims would not be made.

Applicants respectfully request the Board to reverse the Examiner's position on Issue (f) and find that claims 21 – 52 are patentable over Khanna in view of Depauw.

Based on the above, Appellants request the Board to reverse the Examiner's rejection of the claims on appeal.

Respectfully submitted,

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November 4, 2003